A paper entitled "On the mutual relations of the Bunotherian Mammalia," by Edw. D. Cope, was presented for publication.

Crystallized Serpentine from Delaware.—Professor H. Carvill Lewis remarked that a short time ago, his venerable friend, Dr. Isaac Lea, had handed him for examination a specimen of Deweylite from Way's feldspar quarry, near Wilmington, Delaware, upon which were some crystals of an unknown micaceous substance.

The white, waxy deweylite, weathering to a pale yellow color on the surface, contains numerous angular fragments of transparent quartz, which vary in size from microscopic dimensions to fragments two inches long by one-half inch wide. In all cases these fragments are perfectly sharp and are generally rhomboidal in shape. These rhombic cleavage fragments are just such as would be produced by throwing a heated crystal of quartz into cold water. Under the microscope, the quartz is shown to contain hair-like microlites and minute oval cavities, the major axes of which are usually placed in one direction.[1]

The deweylite also contains irregular masses of feldspar (albite), which are more or less altered into deweylite. Unlike the fragments of quartz, these feldspar nodules are almost invariably rounded in outline, as though partially dissolved away. The feldspar has lost both its lustre and its hardness. It has a waxy appearance, and its hardness is reduced to 4·5. In some specimens one end is more altered than the other, and it is evident that the deweylite is the result of the alteration of albite.

The third mineral in the deweylite is in the form of plates or crystals of a micaceous substance of a pale smoky pearl color with a faint greenish tinge. The plates may be several inches in diameter, and are traversed by numerous joints or cracks filled with deweylite, which are generally inclined to one another at angles of 60° and 120°. The crystals appear to be sections of an orthorhombic crystal, bounded by six prismatic planes, whose angle of intersection is 120°. In the polariscope, the mineral is seen to be doubly refracting, and is biaxial with a small optic-axial divergence (probably between 10° and 20°), the hyperboles being indistinct.

It has a strong pearly lustre, an eminent basal cleavage, almost micaceous, and is brittle. It has a hardness of 2·5, and specific gravity of 2·41. It is translucent, and by transmitted light is grayish or greenish yellow.

In the closed tube it gives off water and decrepitates slightly, becoming blackish gray or dark steel-colored. In the blow-pipe flame it blackens, then turns white, exfoliates slightly and fuses with boiling at 4·5 to a white bead. In the salt of phosphorus bead it dissolves completely to a clear glass which becomes milk-white in a cold saturated bead. With cobaltic nitrate on charcoal

[1] *v.* Further notes on inclusions in gems Isaac Lea, Proc. Acad. Nat. Sc. Phila., May, 1876.

it turns pink. It is decomposed by hydrochloric or sulphuric acid without gelatinization.

At the request of Professor Lewis, Mr. Reuben Haines had made an analysis of the mineral with the following results:—

SiO_2	43·63
MgO	39·71
FeO	0·78
Al_2O_3	2·23
H_2O	13·20
	99·55

Mr. Haines determined the specific gravity in a specific gravity bottle containing a thermometer, the weighing being done at 60° F.

From the composition as well as from its physical characters the mineral appears to be a true serpentine. Its optical characters show that it is crystallized, and not a mere pseudomorph. If so, the crystallization of serpentine is micaceous, as already surmised by Professor Dana.[1]

As the deweylite is the result of the alteration of feldspar, so the serpentine has been altered from mica (muscovite). The relative amount of muscovite in the adjoining graphic granite is about the same as that of the micaceous serpentine in the deweylite. Moreover in certain specimens of feldspathic deweylite, where the feldspar is not completely altered, there occur crystals of hydromuscovite (margarodite) in place of the micaceous serpentine.

Thus it is evident that the serpentine is changed from mica. Were it not for the ready cleavage and the special optical characters of the serpentine, it should be regarded merely as a pseudomorph. The occasional markings at angles of 120°, though scarce and imperfect, are in harmony with the same character belonging to several other micaceous species among the magnesian hydrous silicates, and indicate a close relationship between the serpentine group and the Vermiculite group of minerals.

It is interesting to find in the quartz, deweylite and serpentine, just described, such complete evidence that they have been derived from the direct alteration of graphic granite (pegmatite). While the albite and muscovite have changed into deweylite and serpentine respectively, the quartz has been broken up into cleavage fragments, and scattered through the deweylite. This fracturing of the quartz may, perhaps, give a clue to the method of alteration. As Hunt[2] has suggested, in an early period of geological history, when the earth's crust was hotter than now, and when a high temperature existed even at slight depths, thermal waters would abound and chemical changes would be rapid. Should such waters, highly charged with magnesian salts, come in contact with the heated

[1] System of Mineralogy, p. 465.

[2] Chem. and Geol. Essays, p. 306.

feldspathic rocks, there might result such a change as is here shown to have occurred. Certain facts which the speaker had observed in the serpentine deposits of Chester County, Penna., notably in Brinton's quarry, indicate that a change from a granitic dyke into serpentine is not an uncommon occurrence.

The two points of interest offered by the specimens here described are, 1. The crystallization of serpentine, as shown by its optical character; 2. The direct alteration of the feldspar and mica of graphic granite into the magnesian minerals, deweylite and serpentine, while the quartz has been fractured.

Contraction of Vegetable Tissues Under Frost.—At the last meeting of the Botanical Section, Mr. MEEHAN referred to a prevalent opinion that the liquid in vegetable tissues congealed as ordinary liquid does, and, expanding, often caused trees to burst with an explosive sound. Mr. Meehan made experiments with young and vigorons trees, varying from one foot to three feet in circumference. They were carefully measured in early winter when the thermometer was about 40°, and again after they had been exposed for many days to a temperature below freezing point, and, at the time of measurement, to 10° above zero.

In no case was there the slightest evidence of expansion, while in the case of a large maple (*Acer dasycarpum*), of 3 feet 11½ inches round, there appeared to be a contraction of ⅛ inch. This was the largest tree experimented with. In dead-wood soaked with water, there was an evident expansion; and the cleavage with explosion, noted in the case of forest trees in high northern regions, may result from the freezing of liquid in the centre or less vital parts of the trunks of trees.

In some hardy succulents, however, instead of expansion under frost, there was a marked contraction. The joints or sections of stem in *Opuntia Rafinesqui* and *O. Missouriensis*, shrink remarkably with the lowering of the temperature. As soon as the thermometer passes the freezing point, the shrinkage is so great that the whole surface has the wrinkled appearance presented by the face of some very aged person. A piece of *Opuntia Rafinesqui*, which in November measured 4 inches in length, is but 3½ now, and is not half the thickness it was in the autumn. In the winter when the thermometer was down to 10° above zero, the pen-knife penetrated the tissue just as easily as in summer, and no trace could be discovered of congelation in the juices of the plant. Other succulents exhibited more or less signs of shrinkage under extreme cold. *Mamillaria Nuttallii*, and *M. vivipara*, with *Echinocactus Simpsoni*, a mamillose form, drew the mammæ upwards, and had them appressed as closely as the spines would allow—and some species of *Sempervivum* did the same. This could only be accomplished by the contraction of the main axis from the apex downwards. *Sedum Hispanicum*, which has not a succulent axis, contracts its leaves into longitudinal wrinkles, pre-